4.3.2. Supplier or Contractor Quality Plan Assessments (Oversight and Assurances)

All quality plan requirements are cascaded throughout the supply base and are ensured through documentation and verification.

4.3.3. Documentation and Record Management (Data Package Requirements)

All associated documentation and records are formalized and maintained throughout the project. All assurances are made to verify correct procedure usage, record integrity, and maintenance.

4.3.4. CAPA System (Corrective Action/Preventive Action)

An effective CAPA system is in place to both prevent issues from occurring and to identify issues and concerns that have occurred to ensure corrective action and to prevent recurrence.

4.3.5. Communicate

The process of communicating and consulting with key stakeholders on quality management status is facilitated through the use of project self-assessment, audit reports, inspection reports, and cost or schedule updates. This communication may also be part of a non-conformance or corrective action program. The team is to document and communicate the non-conformance, along with the associated corrective action, preventative action, and possible lessons learned. At a minimum, deviations from quality standards are required to be recorded on the project report monthly.

5. Warehouse and Tool Management

5.1. Warehouse Optimization

In the 1980s, the Toyota Production System was introduced in North American manufacturing as “Just-In-Time” (JIT) inventory control. Basically, the concept was that inventory is an insurance policy. As equipment, processes, and operator skill levels improved throughout an operation, the raw materials, component parts, works-in-process, and finished goods inventory throughout the manufacturing process dramatically decreased. In the automotive industry, this meant millions of dollars of capital were freed up with a successful JIT program. Optimizing space utilization, material flow, order picking, and dock operations create significant cost savings in material and labor.

At the site level in the wind industry, most warehouse facilities are very small in comparison to the manufacturing industry. An efficient use of space is always desired in construction and service operations to control cost. Whether the building is new or an existing property, the first step in improving material and work flow is to use the value stream mapping tool. Wind farm warehouse layouts are fairly standard in design, consisting of pallet racking, small parts shelving, oil storage, oil containment, and shipping/receiving areas. With limited floor space, the goal is often simply to use all horizontal and vertical space as effectively as possible, reducing time to pick and stage parts that could otherwise be spent more productively. For example, oil management can be optimized by setting up a rack with the different oils, coolants, and cleaners in bulk storage tanks. The tanks can be easily filled by pumps and dispensed by hoses connected to a valve header.

5.2. Metrics and Accountability

The standard measures for monitoring the health of a warehouse are inventory accuracy and total cost. Measurement of inventory turns can also be applied. However, many stock decisions are based on component lead-times, and inventory turns often are dictated by the make, model, and age of the equipment. Inventory levels can balloon or become inaccurate very quickly if not kept in check. Non-inventory items, especially, tend to grow exponentially if not tracked by piece or part count. Most non-inventory items are written off and have no assigned cost, which makes information difficult to share with other sites. A good practice is to establish a “blacklist” of non-inventory parts that can be shared, especially after initial construction, otherwise the items end up lost or damaged in the yard or warehouse without a chance of recovering value, except, inevitably, as scrap.

5.2. Metrics and Accountability
(continued)

Every warehouse needs a trained associate to maintain the stock and to maintain the integrity of the material requirements planning (MRP) system that tracks inventory levels and re-order points. While great effort is typically paid to training technicians, formal inventory control training is usually non-existent, consisting of basic MRP software data entry with no warehouse or logistic training. With wind farm sizes varying dramatically, it is often not viable to have a dedicated inventory coordinator onsite. In either case, an employee with the aptitude and organizational skill needs to be identified and made accountable. Bar coding can be used to enter and relieve stock, for example. And with many scanning systems, the parts can be scanned and assigned directly to a work order. Ultimately, there needs to be one local associate assigned to guarantee the integrity of the part levels through daily or weekly cycle counting. A great resource to help setup inventory and logistic training is the American Production and Inventory Control Society, or APICS™. Their website offers learning resources and an industry certification to use as a benchmark.

6. Technician Continuous Improvement

In order to create a quality culture, it is important to ensure that technicians receive skills and knowledge regarding the use of data driven problem-solving. This could be analysis for special cause variation or the use of Six Sigma tools for common cause variation. In an ideal state, promotions to more advanced wind technician levels include the requirement to have the data driven problem-solving skill set in place. This includes both the academic and real world application of quality tools.

A format used for special cause variation analysis is the “Quality Improvement Story”. This is a seven step problem-solving process in which the team uses data to identify a project indicator and sets a target for improvement. A tie to the customer focus and company strategy is established, ensuring focus remains on the primary key objectives as defined by the customer. Project teams gather additional information, using tools like Pareto graphs, to further scope the problem. Then, they use an additional tool for analysis, such as the fishbone diagram, to brainstorm potential causes. The potential causes are verified through testing. The testing performed must identify the true root cause of the problem and any contributing factors.